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Sub Spec  
RHB  
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## UNITED STATES PATENT

### TITLE

Wet friction braking device with inward and outward circulating cooling means.

### BACKGROUND OF THE INVENTION

The invention relates to a method of cooling the friction surfaces of a wet interleaved friction disc brake by using vaned impellers acting as inward pumps. Commonly used cooling methods are forced flow outward circulation; or dip or splash cooling as the rotating plates dip into a sump or reservoir.

The use of forced flow cooling places a high emphasis on oil passage design including plate grooving, oil dispersion to the friction surfaces as well as rotating seals, a sump reservoir and a positive displacement pump. e.g. ~~Aschauer US 3,833,100~~ Higher cost and complexity result. In sump cooling the rotating discs may dip into a sump or impinge an annular surrounding oil reservoir or torus created by centrifugal action. If the plates dip into these reservoirs excessively, for example, one third dip to full immersion objectionable viscous drag occurs resulting in heating and power loss.

Considerable effort has been devoted exploring the optimum friction surface cooling, balancing excess oil flow with ensuing drag loss, versus insufficient cooling giving limited or marginal oil cooling amounts for certain discs in the pack. Speed of operation affects with internal outward forced cooling as well as dip or splash cooling.

At lower speeds centrifugal pressure is relatively low and circulation may be poor for forced cooling. Conversely at high speeds the coolant may be accelerated too rapidly and follow a path of least resistance resulting in incomplete friction surfaces cooling.